

What is claimed is:

1. A method of manufacturing a semiconductor device, comprising a step of:

(a) forming a pattern in a second region encompassing therewith a first region over a semiconductor substrate,

the step (a) including steps of:

(b) forming a first film over the first region, a third region encompassing therewith the second region, and first and second connection portions connecting the first region and the third region;

(c) after the step (b), forming a second film over the semiconductor substrate; and

(d) after the step (c), removing the first film to remove the second film over the first region, the third region and the first and second connection portions, and thereby forming two patterns comprised of the second film over the second region.

2. A method of manufacturing a semiconductor device according to Claim 1, wherein the first film is a photoresist film and the second film is a conductive film.

3. A method of manufacturing a semiconductor device according to Claim 1,

wherein the first region and the third region are connected in a first direction via the first and second

connection portions, and

wherein the width of each of the first and second connection portions in a second direction vertical to the first direction is smaller than the width of the first region in the second direction.

4. A method of manufacturing a semiconductor device according to Claim 1, further comprising a step of:

(e) forming another conductive film for electrically connecting the two patterns after the step (d), wherein the second film is a conductive film.

5. A method of manufacturing a semiconductor device according to Claim 1, wherein the semiconductor substrate or a film just below the two patterns is comprised of a compound semiconductor.

6. A method of manufacturing a semiconductor device according to Claim 5, wherein the semiconductor substrate or the film just below the two patterns is comprised of gallium arsenide (GaAs) or indium phosphide (InP).

7. A method of manufacturing a semiconductor device according to Claim 6, wherein the second film is a film having gold (Au) as a main component.

8. A method of manufacturing a semiconductor device according to Claim 1,

wherein the semiconductor device includes a bipolar transistor having a collector layer formed in the first

region and the second region, a base layer formed over the first region of the collector layer, and an emitter layer formed over the base layer, and

wherein the two patterns are collector electrodes formed over the second region of the collector layer.

9. A method of manufacturing a semiconductor device according to Claim 1, wherein the first region has a substantially circular shape or a circular shape with a portion cut out thereof.

10. A method of manufacturing a semiconductor device according to Claim 1, wherein the first and second connection portions are arranged substantially symmetrical relative to the first region.

11. A semiconductor device, comprising:

(a) a semiconductor substrate including a first region, a second region encompassing the first region therewith, and a third region encompassing the second region therewith;

(b) a collector layer formed in the first region and the second region;

(c) a base layer formed in the first region over the collector layer;

(d) an emitter layer formed over the base layer; and

(e) a collector electrode formed in the second region over the collector layer and having a first portion and a

second portion separated from each other by two cutout portions.

12. A semiconductor device according to Claim 11, wherein the collector layer and the base layer are each comprised of gallium arsenide (GaAs), while the emitter layer is comprised of indium gallium phosphide (InGaP) or aluminum gallium arsenide (AlGaAs), and

wherein the collector electrode is comprised of a film having gold (Au) as a main component.

13. A semiconductor device according to Claim 11, wherein the first region has a substantially circular shape or a circular shape with a portion cut out thereof.

14. A semiconductor device according to Claim 11, wherein the two cutout portions are arranged substantially symmetrical to the first region.

15. A semiconductor device comprising:

(a) a substrate having a first main surface and a second main surface opposite thereto;

(b) a compound semiconductor layer formed over the first main surface;

(c) a first conductive film formed over the compound semiconductor layer;

(d) an opening portion extending from the second main surface and reaching the first conductive film; and

(e) a second conductive film formed over the second

main surface and in the opening portion,

(f) wherein the first conductive film is comprised of a refractory metal or a nitride or silicide of a refractory metal.

16. A semiconductor device according to Claim 15, wherein the first conductive film is comprised of tungsten silicide (WSi), titanium tungsten (TiW) or titanium (Ti).

17. A semiconductor device according to Claim 15, wherein the compound semiconductor layer contains gallium arsenide (GaAs) or indium phosphide (InP).

18. A semiconductor device according to Claim 15, further comprising: (g1) a collector layer; (g2) a base layer formed over the collector layer; (g3) an emitter layer formed over the base layer; and (g4) a collector electrode, a base electrode and an emitter electrode electrically connected to the collector layer, the base layer and the emitter layer, respectively,

(h) wherein the first conductive film and the emitter electrode are formed of the same material.

19. A method of manufacturing a semiconductor device, comprising steps of:

(a) preparing a substrate having a first main surface and a second main surface opposite thereto;

(b) forming a compound semiconductor layer over the first main surface;

(c) forming, over the compound semiconductor layer, a first conductive film comprised of a refractory metal, or a nitride or silicide thereof;

(d) forming an opening portion extending from the second main surface and reaching the first conductive film; and

(e) forming a second conductive film over the second main surface and in the opening portion.

20. A method of manufacturing a semiconductor device according to Claim 19, wherein the step (d) comprises wet processing.

21. A method of manufacturing a semiconductor device according to Claim 19, wherein the first conductive film is comprised of tungsten silicide (WSi), titanium tungsten (TiW) or titanium (Ti).

22. A method of manufacturing a semiconductor device according to Claim 19, wherein the compound semiconductor layer contains gallium arsenide (GaAs) or indium phosphide (InP).

23. A method of manufacturing a semiconductor device according to Claim 19, further comprising the steps of:

(f1) forming, over the first main surface, a first semiconductor region having a first conductivity type;

(f2) forming a second semiconductor region having a second conductivity type, which is a conductivity type

opposite to the first conductivity type, over the first semiconductor region;

(f3) forming a third semiconductor region having the first conductivity type over the second semiconductor region; and

(f4) forming first to third electrodes electrically connected to the first to third semiconductor regions, respectively,

(g) wherein the third electrode and the first conductive film are formed in the same step.